DOI:
10.1098/rstb.2010.0210

Document Version
Publisher's PDF, also known as Version of record

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B BIOLOGICAL SCIENCES

The injured mind in the UK Armed Forces

N. Greenberg, E. Jones, N. Jones, N. T. Fear and S. Wessely

Phil. Trans. R. Soc. B 2011 **366**, 261-267
doi: 10.1098/rstb.2010.0210

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B

Phil. Trans. R. Soc. B (2011) **366**, 261–267
doi:10.1098/rstb.2010.0210

Review

The injured mind in the UK Armed Forces

N. Greenberg[1,*], E. Jones[2], N. Jones[3], N. T. Fear[3] and S. Wessely[2]

[1]*Academic Centre for Defence Mental Health, Weston Education Centre, Cutcombe Road, London SE5 9RJ, UK*
[2]*King's Centre for Mental Health and Research, and* [3]*Academic Centre for Defence Mental Health, King's College London, London, UK*

The mental health of the UK Armed Forces is a topic much debated by healthcare professionals, politicians and the media. While the current operations in Afghanistan, and the recent conflict in Iraq, are relevant to this debate, much of what is known about the effects of war upon the psyche still derives from the two World Wars. This paper will examine the historical and contemporary evidence about why it is that some Service personnel suffer psychological injuries during their military service and others do not. The paper will also consider some of the strategies that today's Armed Forces have put in place to mitigate the effects of sending military personnel into danger.

Keywords: military health; post-traumatic stress disorder; alcohol abuse; stigma; trauma risk management

1. THE TWENTIETH CENTURY VIEW OF OPERATIONAL STRESS INJURIES

Before World War 1, there were few, if any, published reports or studies that specifically related to the mental health of the Armed Forces. However, the sheer scale of the shell-shock epidemic brought the issue of psychological casualties to the fore. From then on, there has been a steady increase in the number of scientific papers on military mental health, even if the advancement of knowledge has not always followed in such a linear fashion.

In general, the literature can be divided into two themes—post-combat disorders and issues of management, including military culture. These will be discussed in turn.

(a) *Post-combat disorders*

The research into the lasting effects of war upon the mind suggested that post-combat disorders come in two varieties: overt, short-term, psychological presentations (such as battle exhaustion, flying stress, combat stress reaction and post-traumatic stress disorder) and longer term post-conflict syndromes characterized by medically unexplained symptoms (soldier's heart, aviator's neurasthenia, effort syndrome, Gulf War syndrome). 'Shell-shock', an ill-defined term introduced in 1915, included both the short-term psychological effects of battle and chronic somatoform cases.

War not only kills and wounds, it also generates some of the most intense stressors known to man. During World War 1, it was believed that a healthy individual who was well-trained and integrated into a unit with high morale was resistant to psychological pressures. Lt Colonel Gort VC of the Grenadier Guards and future leader of the British Expeditionary Force in 1940 argued that 'in face of strong morale and *esprit de corps* shell-shock would be practically non-existent' [1, p. 50]. It was acknowledged, however, that an exceptional event could lead to breakdown in a healthy soldier, but a full recovery was expected once he had been removed to a place of safety. Shell-shock cases were initially conceptualized as only affecting men who suffered from hereditary weaknesses. As a result, psychiatric casualties were considered preventable by selection, training and leadership. War was not the cause of psychological breakdown but merely a trigger [2].

The experiences of World War 2 did little to change these views, so that the hypothesis of inherent vulnerability was invoked to explain post-combat disorders throughout the conflict. However, as the war progressed, important exceptions were identified and by the end of 1943, it was accepted that successful soldiers had a breaking point [3]. Even carefully selected and well-trained volunteers, if exposed to repeated or prolonged stress, could suffer serious psychological effects. Captains of escort vessels, bomber crews and commandos, many with decorations for valour, found themselves referred to psychiatric units suffering from what was then called 'battle exhaustion' [4]. However, because these examples were a minority, and expected to return to full health, most psychiatric casualties continued to be attributed to pre-existing vulnerabilities or failures of selection and training. It was not until the Vietnam War that this position reversed. With the recognition of post-traumatic stress disorder (PTSD), causation was turned on its head. The traumatic event became primary, while family history and personality

* Author for correspondence.

One contribution of 20 to a Theme Issue 'Military medicine in the 21st century: pushing the boundaries of combat casualty care'.

characteristics, hitherto considered paramount, were relegated to secondary roles. PTSD has become the psychiatric diagnosis most readily associated with the Armed Forces, though recent studies have consistently shown that depression, anxiety disorders and alcohol abuse have a higher prevalence [5]. Despite some claims to the contrary, PTSD seems not to be a 'universal stress reaction', arising in all societies across all time. Evidence from both World Wars suggests that the ways in which Service personnel communicate distress is culturally determined and that the development of PTSD may be one more phase in the evolving picture of human reaction to adversity.

By contrast, post-combat syndromes characterized by medically unexplained symptoms have often defied treatment and led to long-term invalidity in veterans [6]. Gulf War syndrome was perhaps the clearest example, though the legacy of shell-shock affected greater numbers of ex-servicemen. Without demonstrable pathology or beyond the reach of investigative techniques, such disorders caught the medical community by surprise and fed on popular health fears. They attracted the attention of the media and provided a focus for veterans' pressure groups. Similarly, mild traumatic brain injury (mTBI), a disorder brought to the fore by explosive devices in Iraq and Afghanistan, has much in common with shell-shock from World War 1 and post-concussional syndrome from World War 2 [7,8]. Earlier generations believed that research would distinguish between the physical and psychological causes of ill health in soldiers exposed to blast. The *Report of the War Office Committee of Enquiry into 'Shell-Shock'* recommended that evidence be sought to limit the term to those cases in which a 'causal connection' existed between 'the effects of the explosive force and the symptoms resulting from the shock to the nervous system' [1, p. 101]. This endeavour failed largely because post-combat syndromes are characterized by common and non-specific symptoms. Furthermore, a clear-cut distinction between physical and psychological injury is unlikely to be realized, not least because the two coexist.

(b) *Psychiatry and military culture*

Psychiatry has not always dovetailed neatly into military culture. During both World Wars, psychiatrists were viewed with suspicion by commanders and medical colleagues who believed that they lacked effective treatments, while offering malingerers an easy escape route from the battlefield. Stigma of mental illness was widespread in the Armed Forces and some senior officers, such as Lord Gort, argued that shell-shock 'must be looked upon as a form of disgrace to the soldier' to discourage servicemen from seeking a psychological discharge [1, p. 50]. A commander of medical services in Tunisia had ordered Majors Wishart and Kenton, two newly arrived psychiatrists, not to disclose their specialist training as 'he had promised all the hospitals that no gentlemen with such an interest would be permitted in the [First] army', while Brigadier Morrison, his counterpart on Malta, refused to allow a psychiatrist to land on the island [9, pp. 211–212]. Thus, during both World Wars, it was believed that by their mere presence military psychiatrists could undermine the fighting spirit. In some circumstances, stigma also served the interests of the military, especially in times of manpower crisis [10], but came with a price. Indeed, many soldiers who had served valiantly but who had reached their breaking point were reluctant to report their illnesses for fear of ridicule or shame; stigma was such that in the post-1945 period, admissions registers and case notes for officers who had been treated for psychological disorders were systematically destroyed to protect their identity [4]. Such beliefs could not be easily addressed because they reflected the cultural values of the society from which servicemen were recruited.

Under pressure during both World Wars to demonstrate an effective role, some military psychiatrists over-estimated the effectiveness of forward psychiatry, an intervention designed to treat disturbed personnel within the sound of battle as quickly as possible with the expectation of a return to duty [7,8]. When ambitious targets were not achieved during the campaign for Normandy, for example, not only were individual mental health officers undermined but the service as a whole came under scrutiny [4].

The creation of the new category of PTSD by the American Psychiatric Association in 1980 signalled a sea change in the acceptance of psychological injury by the Armed Forces and society in general. During the Vietnam conflict itself, psychiatric casualties were actually surprisingly few, apparently at lower levels than in World War 2 or Korea, causing some to say that the problem of psychiatric battle casualties had been resolved. But then came the new diagnosis of PTSD. Using new concepts, a key study conducted 15 years after the end of the war found that 15 per cent of male veterans then suffered from PTSD and about one-third would suffer from PTSD during their lifetime [11]. These results contrasted with an earlier study, which had discovered that only 2 per cent currently experienced the disorder while 15 per cent had at some time met criteria for PTSD [12].

Putting to one side the question of whether PTSD was introduced for political or scientific reasons, what it did achieve by focusing on the role of war trauma as opposed to predisposition was a slow, sometimes grudging, but nevertheless increasing acceptance of psychiatric injury. The problems and debates, however, did not disappear, fuelled, perhaps by being often reliant on the use of self-report questionnaires in a culture tinged by stigma that often prevented personnel from honestly answering questions for fear of the consequences. It would be an optimist who claimed that this is now a thing of the past.

2. MORE RECENT EVIDENCE FROM UK MILITARY OPERATIONS IN IRAQ?

Although the UK Armed Forces had been engaged in numerous conflicts since the end of World War 2, it was not until after the 1991 Gulf War (codenamed OP Granby) that a robust epidemiological approach to studying the health of the UK Armed Forces began. Even then, the results of the numerous studies

into the conundrum that became 'Gulf War syndrome' [13] were conducted as a reaction to the substantial numbers of media-fuelled stories that began a few years after the end of the conflict. Since the research efforts began, there have been large numbers of studies investigating the complex and controversial condition. Despite this, no single biomedical cause has been identified which might explain why a substantial proportion of coalition troops suffered, and indeed continue to suffer [14] from multiple physical symptoms which they attribute to service in the 1991 Gulf War. The UK studies into Gulf War syndrome found that about one in five of UK Service personnel who took part in OP Granby reported, and in 2001 continued to report, more symptoms of poor physical health than those who had not; the nature of this ill health remains obscure.

The complex issue that became Gulf War syndrome, with its negative impact on individual health and institutional reputations, was an important driver for the Ministry of Defence (MOD) deciding to formally fund a wide-ranging, proactive, cohort study into the health of UK Service personnel who were to deploy to Iraq in 2003 (These operations were codenamed OP TELIC). Another important driver for conducting proactive research was the PTSD class action brought by ex-Service personnel against the MOD in 2001. Although the case was successfully defended, at a considerable cost (approx. £20 000 000) [15], it again highlighted the need to base policy upon research rather than speculation.

The first UK-focused study into the effects of OP TELIC, covering the period 2003–2005, found that overall service in Iraq had not led to an increase in mental health problems, compared with a comparable sample of the UK Armed Forces who had not at that time served on OP TELIC [16]. About 20 per cent of the military personnel surveyed reported symptoms suggesting that they suffered from common mental health disorders (such as depression or anxiety) and 4 per cent reported symptoms of probable PTSD. However, both combat troops and reservists were at increased risk of suffering from PTSD, but the actual rates in both groups remained low, in the region of 6 per cent.

Despite the fears that history might repeat itself, another notable finding was the absence of any excess of medically unexplained symptoms—in other words, there was no evidence of an 'Iraq War syndrome' [17], a finding of interest when one recalls that some of the possible culprits identified as contributing to 'Gulf War syndrome', such as anthrax vaccination, pyridostigmine bromide tables and the use of depleted uranium munitions, were also used in 2003.

The initial OP TELIC studies were, therefore, somewhat reassuring; even though there were some groups of personnel who were reporting increased rates of psychological ill health, the absolute rates were small. Furthermore, the overall burden of psychological ill health was generally in keeping with the rates found in the general population. In another development, telephone interviews were used to validate the rates found in the self-reported questionnaire-based survey [18].

3. MORE RECENT EVIDENCE FROM UK OPERATIONS IN IRAQ AND AFGHANISTAN

However reassuring the initial King's study results had been, since the research was completed, operations in Iraq intensified and there was an expansion of the UK military presence in Afghanistan. Because the operational intensity, which had been relatively low in the early years of OP TELIC, had increased, the numbers of physical casualties had also increased as described elsewhere in this issue. As the link between psychological and physical injury is well established [2], there was every reason to envisage that the health of the UK Armed Forces may have changed, most probably for the worse, since the earlier King's studies had finished.

Another driver for conducting further research was the psychological health of the US military that had been waging war in Iraq and Afghanistan alongside UK forces. There had been numerous studies of US troops that had identified them as suffering substantially higher rates of psychological ill health, especially PTSD [19]. More perplexingly, US PTSD rates had been observed to increase with time since return from deployment [20], the opposite to what might be expected from other studies of the natural history of traumatic distress. Therefore, there had been speculation that the UK would be faced with a 'tidal wave' of mental disorders in years to come [21,22]. Furthermore, US data had found an association between multiple deployments and increased frequency of mental disorders [23,24].

The result was that the King's College London research team were asked to extend the original study to examine three main areas of interest: (i) what was the legacy of deployment to Iraq and Afghanistan from 2003 to the beginning of 2009; (ii) what was the impact of multiple deployments; and (iii) had there been a similar increase in mental disorders over time since deployment as observed in the USA [5].

In order to meet the study's aims, all those who had responded to the first phase of the study [16] were re-surveyed with the addition of two new randomly chosen samples—those with recent deployment experience to Afghanistan, and those who had joined the UK Armed Forces since April 2003. This sampling strategy, therefore, ensured that the final sample continued to be representative of the UK Armed Forces. The surveys were distributed between November 2007 and September 2009. The final participation rate was 56 per cent ($n = 9990$), and the resultant sample included regulars, reservists and those who had left the military.

Given the high operational tempo that UK forces had been operating under, the results of the survey were again both surprising, but in part reassuring [5]. The overall mental health of the UK Armed Forces remained good and did not significantly differ from the results of the earlier study; the prevalence of probable PTSD was 4 per cent ($n = 376$), 19.7 per cent ($n = 1908$) for symptoms of common mental disorders and 13 per cent ($n = 1323$) for alcohol misuse. However, those engaged on combat operations and reservists continue to be more likely to report symptoms of PTSD (7 and 5%, respectively).

These results should not, however, be viewed as suggesting that there has been no impact of

deployment; the results clearly speak otherwise. However, it is of interest that the UK rates, in respect of PTSD in particular, are different from rates found in US troops, since both nations operate in similarly intense environments. Some of the US studies have suggested PTSD prevalence rates in excess of 30 per cent [20], whereas the King's studies had consistently reported a whole force PTSD rate of about 4 per cent. Also, previous studies of UK troops who had engaged peacekeeping duties in the late 1990s had also found a similar 4 per cent PTSD prevalence [25], suggesting that a wide range of operational duties did not impact, substantially, on the overall health of the deployed force. Studies carried out with deployed UK troops in Iraq in 2009, and Afghanistan in 2010, had also found PTSD prevalence rates of less than 6 per cent with higher rates being found in troops deployed to the most hostile in-theatre locations [26].

The finding that combat troops reported higher rates of psychological ill health is not surprising given the nature of the operational duties that combat troops carry out; the finding that reserve forces appeared to be more at risk if they deploy is worthy of some consideration. The increased reporting of probable PTSD among reservists did not appear to be a result of experiencing more trauma during deployment but is instead most probably a product of the context in which deployment takes place—in particular, reservists' lower perception of support while on deployment, and their domestic and employment circumstances when they return [27]. It is also notable that the Browne *et al.* [27] paper found that reserve personnel reported higher levels of combat exposures than regular troops. This seems implausible, since within the UK Armed Forces it is regular combat troops who carry out the majority of the combat-orientated duties, the majority of reservists carry out less risky work, often fulfilling specialist roles that are not easily filled using regular personnel; such roles include media handlers, medical personnel and force protection duties. It is therefore more likely that some reservists perceived themselves to have been exposed to higher levels of combat experiences, such as being shot at or having to handle hostile locals, because of their lack of prior experience of such situations.

Although the various UK studies have not shown a substantial mental health effect of deployment, one recurring finding is that alcohol misuse remains a problem. The most recent studies show that the reporting of alcohol misuse is increased among regular personnel on return from deployment. Fear *et al.* [5] found that the prevalence of alcohol misuse among regulars was 11 per cent for those not deployed to Iraq or Afghanistan and 16 per cent among those with deployment experience to Iraq or Afghanistan. These figures, while concerning for the UK military, may at least partially reflect that alcohol misuse is a major concern in the UK, and given their socio-demographics and pre-service background, it is perhaps unsurprising that members of the UK Armed Forces also consume large amounts of alcohol. However, the demographic profile of the Services alone cannot account for the levels of alcohol misuse found among Service personnel who drink more than age- and gender-matched samples of the UK population [28]. Nor can demographics alone account for the increased reporting in alcohol misuse post-deployment. The US military, despite having different attitudes towards alcohol use, also report similar associations of alcohol misuse with deployment and deployment-related experiences [29]. The reason for this is unclear—post-deployment alcohol misuse could be secondary to psychiatric morbidity not measured by standard epidemiological surveys, a biological effect of kindling [30], an effect found in rodents who voraciously consume alcohol after repeated cycles of consumption and withdrawal, or owing to other mechanisms such as military culture, the nature of the post-deployment 'unwinding' process or because of more tolerance of risk taking as a result of deployment experiences. Clearly, this is an area that requires further research.

Another difference between the UK and USA is that whilst US data suggests that US personnel who deploy more frequently have more mental health problems, the latest UK military health research found no association between multiple deployments and the reporting of mental disorders [5]. This may be due to the healthy warrior effect; this is when those who are struggling to cope with deployment as a result of physical injury and illness or mental health problems are made temporarily non-deployable, thus those deploying more than once might be more psychologically robust [31]. The finding of no association with multiple deployments supports the utility in moderating psychological injury of the UK military's Harmony Guidelines [32], which outline the recommended number of deployments and length of time between deployments for the UK Armed Forces. Other research has also shown that it is the actual length of time deployed over a 3-year period, rather than the number of deployments, which is a more important determinant of mental health [33].

Another issue that had vexed the US military was their consistent finding that the rates of psychological disorder, in particular PTSD, appeared to continue to rise over the year following return from deployment [20]. This finding was somewhat perplexing since the majority of prior PTSD research had reported decreasing levels of traumatic stress symptoms over time. The work of Fear *et al.* [5] found evidence for a small increase in the reporting of probable PTSD symptoms with increasing time since return from deployment among regulars. The prevalence again was low—ranging from 3 to 6 per cent, and the increase was not at the same magnitude as seen in the USA [20]. There is no clear explanation for these differences. If the explanation is delayed-onset PTSD, that is, PTSD that begins more than six months after exposure to a traumatic event, then it is hard to explain why the effect is more marked in US than UK personnel, given the similarities in exposure, background, threat, and so on. Delayed PTSD is in most studies unusual, although this is often confused with delays in presentation, which is far from unusual in both countries [34]. It may also reflect some personnel finding it increasingly difficult to deal with the transition from an operational theatre to life as usual or concern about forthcoming future deployments, which may

possibly explain the higher rate of increasing symptoms in US personnel as they deploy for longer than UK troops (12 versus six months) and more frequently. Whatever the nature of the increase, the US and UK findings suggest that it may not be safe to consider the effects of singular traumatic incidents as being the same as exposure to multiple incidents over many months while deployed in a high-threat environment.

4. CONTEMPORARY APPROACHES TO SUPPORTING THE MENTAL HEALTH OF ARMED FORCES PERSONNEL

Because of evidence suggesting that operational deployment may impact upon the psychological health of troops, especially those with a combat role, military planners have implemented a variety of operational stress management strategies. Interestingly, nations that contribute personnel to current operations have approached the provision of mental health support differently, although the approaches to providing mental healthcare for those personnel who develop mental disorders are much similar. Although there are likely to be many reasons for the differing approaches, the issue of ownership, in relation to mental health, is likely to be particularly important. For instance, the UK military stance is that the psychological welfare of troops is primarily a chain of command responsibility, whereas other nations place the role of the leader as the paramount determinant of the mental health status of a military unit. Other nations place more responsibility for personnel's mental health with healthcare providers, which may act to absolve leadership of some of the responsibility that the UK approach to mental health places upon them. One notable example of the different approaches to the ownership of mental health can be found in the use of screening to detect mental health difficulties which many nations, including the USA, but not the UK, rely on to detect troops who may be suffering from mental health problems. However, evidence that screening is successful in reducing the overall burden of mental ill health in any military population remains elusive [35].

One of the UK approaches to supporting the mental health of military personnel, not currently used by US forces, is the use of third location decompression (TLD). TLD is a pause in a third location, that is neither in theatre nor back at home, to allow troops who have fought together to 'unwind' together before returning to their home base areas [36]. For UK personnel, the TLD process takes place over 24–36 h in Cyprus in a dedicated military facility. The various recreational activities on offer to troops who are decompressing are aimed to promote social support and allow informal discussions, both of which have been previously found to be beneficial for mental health [37,38]. Personnel also receive psychoeducation briefings that focus on the management of traumatic stress, risky driving and adjustment issues. Although there has been relatively little robust research into whether these briefings are useful, what evidence there is suggests that they may well be helpful for some [39]. Controlled access to alcohol is also permitted alongside other structured social activities such as time on the beach and an evening social event.

A substantial survey of more than 11 000 troops who had just completed the decompression process, carried out in 2008, found that while the majority had been ambivalent or reluctant to engage in TLD before they arrived, approximately 90 per cent of troops reported finding their time in Cyprus to have been helpful. However, although it is encouraging that many find it acceptable, this does not, ipso facto, mean that it does reduce the incidence of post-deployment mental health problems. It is, however, encouraging to note that those who had the most concerns about returning home were the most likely to find it helpful.

Another mechanism for supporting troop's mental health is the use of a peer-delivered psychological first aid process called trauma risk management (TRiM) [40]. TRiM has been in use for many years within some elements of the UK military and has been the accepted pan-service method of dealing with the consequences of potentially traumatic events since 2008. The aims of TRiM are to provide personnel, who ordinarily carry out a wide variety of non-medical roles, with the skills to enable them to monitor how colleagues are coping with the psychological effects of being exposed to potentially traumatic events. Some previous attempts to do this, such as single-session psychological debriefing, turned out to probably do more harm than good, but there is now good evidence that this is not the case with TRiM [40]. Research confirms that the TRiM process is also highly acceptable to military personnel and those units that use TRiM function better than units that do not. One intended aim of TRiM is to reduce the stigma known to be associated with help-seeking [41]. While providing peer, rather than professional, support should be more acceptable to military personnel, as yet there is no conclusive data to show that the use of TRiM has altered stigma. Recent data from a 2010 survey of mental health in Afghanistan showed that the use of TRiM had increased substantially since a similar survey was conducted in Iraq in 2009 and that levels of reported stigma were lower in troops deployed to Afghanistan than to Iraq. However, it is impossible to be certain that the increased use of TRiM played a role in the reduction of stigma between the two surveys. In general, cultural shift takes time, and it may be some years before it is possible to determine what impact, if any, TRiM has on the levels of reported stigma within the military.

5. CONCLUSIONS

While the mental health of service personnel remains a much debated topic, most probably because the large numbers of physically injured personnel have brought the plight of the sailor, soldier or airman to prominence, the adverse psychological effects of war have been known about for a long time. However, while PTSD and other post-conflict disorders are now frequently discussed, it is often forgotten that the majority of Service personnel are not detrimentally

affected by their time in uniform; in fact, in many cases, the opposite may be true. Service personnel often come from the more socially deprived segments of society and there is robust evidence that pre-enlistment vulnerability makes a substantial contribution to post-deployment mental health problems, of a similar order of magnitude to actual events in theatre [42].

Modern research methods have allowed a more detailed understanding of the factors that influence the mental health of Service personnel; the senior military commanders of World War 1 were correct in their opinion that selection, training and leadership were at the heart of the prevention of breakdown. But the commanders in World War 2, who concluded that even with the best of preparation, psychiatric casualties could only be reduced or better managed, but never eliminated, were also correct. Mental health problems in Service personnel over the past hundred years of warfare were and remain a balance between vulnerabilities acquired before a person joins the Armed Forces and traumatic events during their military service. While more research will undoubtedly increase our understanding of why it is that the majority of personnel remain resilient to the potentially detrimental effects of deployment, it is inevitable that some Service personnel will become damaged as a result of doing their duty today as they have been in previous wars.

REFERENCES

1 Southborough & Lord 1922 *Report of the War Office committee of enquiry into 'shell-shock'*. London, UK: HMSO.
2 Jones, E. & Wessely, S. 2007 A paradigm shift in the conceptualization of psychological trauma in the twentieth century. *J. Anxiety Disord.* **21**, 164–175. (doi:10.1016/j.janxdis.2006.09.009)
3 Wessely, S. 2006 Twentieth century theories on combat motivation and breakdown. *J. Contemp. Hist.* **41**, 269–286.
4 Jones, E. & Ironside, S. 2010 Battle exhaustion: the dilemma of psychiatric casualties in Normandy, June–August 1944. *Hist. J.* **53**, 109–128. (doi:10.1017/S0018246X09990495)
5 Fear, N. T. *et al.* 2010 What are the consequences of deployment to Iraq and Afghanistan on the mental health of the UK armed forces? A cohort study. *Lancet* **375**, 1783–1797. (doi:10.1016/S0140-6736(10)60672-1)
6 Jones, E., Everitt, B., Ironside, S., Palmer, I. & Wessely, S. 2008 Psychological effects of chemical weapons: a follow-up study of First World War veterans. *Psychol. Med.* **38**, 1419–1426. (doi:10.1017/S003329170800278X)
7 Jones, E., Fear, N. T. & Wessely, S. 2007 Shell shock and mild traumatic brain injury: an historical re-evaluation. *Am. J. Psychiatry* **164**, 1641–1645. (doi:10.1176/appi.ajp.2007.07071180)
8 Jones, E., Thomas, A. & Ironside, S. 2007 Shell shock: an outcome study of a First World War 'PIE' unit. *Psychol. Med.* **37**, 215–223. (doi:10.1017/S0033291706009329)
9 Shephard, B. 2000 *A war of nerves, soldiers and psychiatrists 1914–1994*. London, UK: Jonathan Cape.
10 Jones, E. 2006 'LMF': the use of psychiatric stigma in the Royal Air Force during the Second World War. *J. Mil. Hist.* **70**, 439–458.
11 Kulka, R. A., Schlenger, W. E., Fairbank, J. A., Hough, R. L., Jordan, B. K., Marmar, C. R. *et al.* 1990 *Trauma and the Vietnam War generation: report of findings from the National Vietnam Veterans Readjustment Study*. New York, NY: Brunner/Mazel.
12 Centers for Disease Control Vietnam Experience Study. 1988 Health status of Vietnam Veterans. 1: psychosocial characteristics. *JAMA* **259**, 2701–2707. (doi:10.1001/jama.259.18.2701)
13 Greenberg, N. & Wessely, S. 2008 Gulf War syndrome: an emerging threat or a piece of history? *Emerg. Health Threats J.* **1**, e10. (doi:10.3134/ehtj.08.010)
14 Hotopf, M., David, A., Hull, L., Nikalaou, V., Unwin, C. & Wessely, S. 2003 Gulf War illness—better, worse or just the same? A cohort study. *Br. Med. J.* **327**, 1370.
15 McGeorge, T., Hacker Hughes, J. & Wessely, S. 2006 The MOD PTSD decision: a psychiatric, perspective. *Occup. Health Rev.* **122**, 21–28.
16 Hotopf, M. *et al.* 2006 The health of UK military personnel who deployed to the 2003 Iraq war: a cohort study. *Lancet* **367**, 1731–1741. (doi:10.1016/S0140-6736(06)68662-5)
17 Horn, O., Hull, L., Jones, M., Murphy, D., Browne, T., Fear, N. T., Hotopf, M., Rona, R. & Wessely, S. 2006 Is there an Iraq war syndrome? Comparison of the health of UK service personnel after the Gulf and Iraq wars. *Lancet* **367**, 1742–1746. (doi:10.1016/S0140-6736(06)68661-3)
18 Iversen, C. A. *et al.* 2009 The prevalence of common mental disorders and PTSD in the UK military: using data from a clinical interview-based study. *BMC Psychiatry* **9**, 68. (doi:10.1186/1471-244X-9-68)
19 Hoge, C. W., Castro, C. A., Messer, S. C., McGurk, D., Cotting, D. I. & Koffman, R. L. 2004 Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N. Engl. J. Med.* **351**, 13–22. (doi:10.1056/NEJMoa040603)
20 Sundin, J., Fear, N. T., Iversen, A., Rona, R. J. & Wessely, S. 2009 PTSD after deployment to Iraq: conflicting rates, conflicting claims. *Psychol. Med.* **40**, 367–382. (doi:10.1017/S0033291709990791)
21 Smith, M. 2009 Scores of troops traumatised by Afghan war. *The Sunday Times*, 26 April 2009. See http://www.timesonline.co.uk/tol/news/politics/article6168982.ece (accessed 22 April 2010).
22 Hickley, M. 2008 British troops back from Afghanistan are 10 times more likely to suffer mental illness, say MOD. *Mail Online*, 5 November 2008.
23 Office of the Command Surgeon US Forces Afghanistan (USFOR-A) and Office of the Surgeon General United States Army Medical Command. 2009 Mental Health Advisory Team (MHAT) 6. Operation Enduring Freedom 2009, 6 November 2009, Afghanistan.
24 Reger, M. A., Gahm, G. A., Swanson, R. D. & Duma, S. J. 2009 Association between number of deployments to Iraq and Mental Health Screening Outcomes in US army soldiers. *J. Clin. Psychiatry* **70**, 1266–1272. (doi:10.4088/JCP.08m04361)
25 Greenberg, N., Iversen, A., Hull, L., Bland, D. & Wessely, S. 2008 Getting a peace of the action: measures of Post Traumatic Stress in UK military peacekeepers. *J. R. Soc. Med.* **101**, 78–84. (doi:10.1258/jrsm.2007.070024)
26 Mulligan, K., Fear, N. T., Jones, N., Wessely, S. & Greenberg, N. In press. Psycho-educational interventions designed to prevent deployment-related psychological ill-health in Armed Forces personnel: a review. *Psychol. Med.* (doi:10.1017/S003329171000125X)
27 Browne, T., Hull, L., Horn, O., Jones, M. & Murphy, D. 2007 Explanations for the increase in mental health problems in UK reserve forces who have served in Iraq. *Br. J. Psychiatry* **190**, 484–489. (doi:10.1192/bjp.bp.106.030544)

28 Henderson, A., Greenberg, N. & Langston, V. 2008 Alcohol misuse in the Royal Navy. *Occup. Med.* (*Lond*) **59**, 25–31. (doi:10.1093/occmed/kqn152)
29 Wilk, J. E., Bliese, P. D., Kim, P. Y., Thomas, J. L., McGurk, D. & Hoge, C. W. 2010 Relationship of combat experiences to alcohol misuse among U.S. soldiers returning from the Iraq war. *Drug Alcohol Depend.* **108**, 115–121. (doi:10.1016/j.drugalcdep.2009.12.003)
30 Malcolm, R. J. 2003 GABA systems, benzodiazepines, and substance dependence. *J. Clin Psychiatry* **64**(Suppl. 3), 36–40.
31 Wilson, J., Jones, M., Fear, N. T., Hull, L., Hotopf, M., Wessely, S. & Rona, R. J. 2009 Is previous psychological health associated with the likelihood of Iraq War deployment? An investigation of the 'healthy warrior effect'. *Am. J. Epidemiol.* **169**, 1362–1369. (doi:10.1093/aje/kwp044)
32 National Audit Office. 2006 Ministry of Defence. Recruitment and retention in the armed forces. Report by the Controller and Auditor General; HC 1633-I session 2005–6.
33 Rona, R. J., Fear, N. T., Hull, L., Greenberg, N., Earnshaw, M., Hotopf, M. & Wessely, S. 2007 Mental health consequences of overstretch in the UK armed forces: first phase of a cohort study. *BMJ* **335**, 603. (doi:10.1136/bmj.39274.585752.BE)
34 Greenberg, N. & Wessely, S. 2009 The dangers of inflation: memories of trauma and post-traumatic stress disorder. *Br. J. Psychiatry* **194**, 1–2. (doi:10.1192/bjp.bp.109.063586)
35 Milliken, C. S., Auchterlonie, J. L. & Hoge, C. W. 2007 Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq War. *JAMA* **298**, 2141–2148. (doi:10.1001/jama.298.18.2141)
36 Hacker Hughes, J. G. H., Earnshaw, M., Greenberg, N., Eldridge, R., Fear, N., French, C., Deahl, M. & Wessely, S. 2008 The use of psychological decompression in military operational environments. *Mil. Med.* **173**, 534–538.
37 Cobb, S. 1976 Social support as a moderator of life stress. *Psychosom. Med.* **38**, 300–314.
38 Greenberg, N., Thomas, S., Iversen, A., Unwin, C., Hull, L. & Wessely, S. 2003 Do military peacekeepers want to talk about their experiences? Perceived psychological support of UK military peacekeepers on return from deployment. *J. Ment. Health* **6**, 565–573.
39 Mulligan, K., Jones, N., Woodhead, C., Davies, M., Wessely, S. & Greenberg, N. 2010 Mental health of UK Military Personnel while on deployment in Iraq: the Operational Mental Health Needs Evaluation (OMHNE). *Br. J. Psychiatry* **197**, 405–410. (doi:10.1192/bjp.bp.110.077263)
40 Greenberg, N., Langston, V., Everitt, B., Iversen, A. C., Fear, N. T. & Wessely, S. 2010 A cluster randomized controlled trial to determine the efficacy of TRiM (Trauma Risk Management) in a military population. *J. Trauma. Stress* **23**, 430–436. (doi:10.1002/jts.20538)
41 Langston, V., Greenberg, N., Fear, N. T., Iversen, A. C., French, C. & Wessely, S. 2010 Stigma and mental health in the Royal Navy. *J. Ment. Health* **19**, 8–16. (doi:10.3109/09638230802522999)
42 Iversen, A. C. *et al.* 2008 Risk factors for post-traumatic stress disorder among UK armed forces personnel. *Psychol. Med.* **38**, 511–522. (doi:10.1017/S0033291708002778)